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Unrealistic hope and unnecessary fear: Exploring how sensationalistic news stories influence health behavior motivation

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ABSTRACT

In light of the inherent conflict between the nature of science (slow, subject to correction) and the nature of news (immediate, dramatic, novel), this study examines the effect of emotional health news coverage on intentions to engage in protective health behaviors. One hundred seventy-seven students read news stories designed to evoke either fear or hope about human papillomavirus (HPV) followed by different levels of response efficacy information regarding an impending HPV vaccine. Results indicated no main effects for emotion frame or response efficacy, but a significant interaction suggested that emotionally-consistent presentations (fear/low efficacy; hope/high efficacy) boosted intentions to engage in protective actions relative to emotionally-inconsistent, sensationalized presentations (fear/high efficacy, hope/low efficacy). Consistent with the emotion-as-frame perspective, this effect was moderated by perceived knowledge about HPV prevention. Effects of the sensationalized story constructions on trust in health news were also evidenced. Implications for the role of emotional health news coverage in priming prior knowledge about preventative health behaviors, along with future research directions, are discussed.

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There is an inherent conflict between the nature of science and the nature of news. Advances in science develop slowly over years of careful investigation, replication, and correction. Yet news offerings, which include health segments as a staple, must find new (and preferably unusual) developments nearly every day to help fill their space. Further, they often use sensationalistic, dramatic, and emotional presentational styles to both capture audience attention and encourage continued viewing (Shoemaker, 1996). This tension between the norms of science and the norms of news likely results in a further tension between how health information *should* be presented to maximize public benefit versus how it *is* presented. That is, the news may present the newest scientific developments or health concerns with greater exaggeration and emotional extremity (i.e., unrealistic optimism and unnecessary fear) than befits the nature of the scientific results (Hampl, 2004; Meyer, 1990).

The implications of such health news coverage for audience health-related attitudes and behaviors may be significant. If health stories exaggerate threat, news consumers may suffer from distorted impressions of the risk of certain potential health threats. Not only might this generate needless worry, but it may also lead people to focus their energies on protecting themselves from less proximal threats (e.g., heavy metal poisoning) over more pressing ones (e.g., heart disease). Conversely, health stories that exaggerate optimism for cures may reduce audience motivation to protect themselves from looming health concerns Thus, emotional framing of health information, both within individual stories and across stories over time, may potentially undermine public health goals. Yet the extant literature currently offers very little insight into how emotional news frames differentially influence audience health response.

Indeed, in light of the likely implications of emotional news presentations on health decision making, it is especially important to determine the optimal message structure for news stories to promote effective action. Although some have suggested that news stories that follow the classic fear appeal structure of threat followed by efficacy information are desirable (Goodall, Sabo, Cline, & Egbert, 2012), audiences' different expectations of persuasive messages versus news stories suggest news stories may benefit from alternative structures. That is, audiences likely expect fear appeals to provide information on both a problem and potential solutions. However, though we may expect the news to inform us of a threat (e.g., a new disease outbreak), solutions are not always available or forthcoming. Thus, audiences are required to depend on their own knowledge to determine how to respond to the news information they receive. Indeed, the emotion-as-frame model (Nabi, 2003, 2007) suggests that activation of previously held knowledge by emotionally framed messages plays a key role in message effects. Thus, the news story structure most likely to lead to positive health change may not be the same as that of persuasive appeals with the same goals. Understanding the news story structure that best promotes healthy behaviors, then, would be of great benefit to both news organizations and public health advocates.

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Guided by the emotion-as-frame model, this research aims to shed light on how different news story structures motivate positive health behaviors by examining the effects of different emotional frames around the presentation of health information in print news. Specifically, we consider how the frames of hope and fear, in addition to the presentation of efficacy information, impact readers' intentions to undertake prevention behaviors. We begin with an overview of research on health news content and structure, followed by an articulation of the emotional framing perspective. An experiment testing the effects of fear and hope-framed health news stories on perceived risk, behavioral intentions, and news credibility is then presented.

Health news coverage

Extant research suggests that a wide range of audiences rely heavily on general market mass media sources for health information (e.g., Brodie, Kjellson, Hoff, & Parker, 1999; Geana, Kimminau, & Greiner, 2011; Lariscy, Reber, & Paek, 2010), and that television and radio are the primary resources for people who are not particularly motivated to seek out health information on their own (Dutta-Bergman, 2004). Yet despite the great social relevance of health information dissemination, there has been surprisingly little research on the content of the health stories distributed through these channels.

Of the health news content analyses that have been performed, many focus on identifying the percentage of news stories that address a specific behavior or illness, like obesity and physical activity (Caburnay et al., 2003; Wallace & Leeders, 2004), cancer (Schwartz & Woloshin, 2002; Slater, Long, Bettinghaus, & Reineke, 2008), sun protection (Scully, Makin, Maloney, & Wakefield, 2014), and vaccination (Danovaro-Holiday, Wood, & LeBaron, 2002; see also Wang & Gantz, 2007). Such studies imply that amount of coverage will influence how important audience members view a particular health concern to be, and some studies have criticized the news for favoring sensational health news topics (e.g., drug use, toxins) over those more relevant to the general public (e.g., tobacco use, heart disease; Frost, Frank, & Maibach, 1997; Prabhu, Duffy, & Stapleton, 1996). However, these concerns are generally not tested, and at least one study has found no relationship between the extent of coverage given to health issues and the degree of importance the public places on them (Stempel & Culbertson, 1984).

More recently, a growing body of research has taken a more nuanced approach to the study of health news, looking at a range of different structural elements associated with story presentation, like one-sided versus two-sided health news coverage (Chang, 2013), the inclusion of prevention and detection information (e.g., Slater et al., 2008; Stryker, Moriarty, & Jensen, 2008), and the inclusion of mobilizing information (Clark, 2011). However, the health message structure element that has received the most consistent attention is story framing.

Framing theories generally posit that the way in which information is presented, or the perspective taken in a message, influences a range of audience responses. As Entman (1993) famously stated, a message frame will "promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation" (p. 52). Several prominent studies provide evidence supporting these claims in a variety of contexts, including how language choice influences risky decision-making (Kahneman & Tversky, 1984), how television news framing affects attributions of responsibility for both the causes of and the treatments for social problems (Iyengar, 1991), and how news coverage of political campaigns influences how the public thinks about political processes (Cappella & Jamieson, 1997).

Consistent with the wealth of literature on framing and political news (e.g., Callaghan & Schnell, 2005) and health decision making (e.g., Rothman & Salovey, 1997), research on health news framing has focused on one of two approaches: (a) examining the specific frames used to present particular health issues in the media, like the "environmental risk" frame around obesity (Lawrence, 2004), the (over) emphasis on genetic causes of breast cancer (Brown, Zavestoski, McCormick, Mandelbaum, & Luebke, 2001), and the "silent epidemic" of lead poisoning (Shibley & Prosterman, 1998), or (b) how generic cognitive frames, such as personal responsibility or episodic/social forces frames, are applied across health contexts (e.g., Coleman, Thorson, & Wilkins, 2011; Major, 2009; Tsung-Jen, Wijaya, & Brossard, 2008). Both the topic-specific and more general health frames assume that the way in which health information is presented has implications for what audiences learn, what they believe is important, and how they choose to act in light of the information they've received.

Given that news stories are often marked by their emotional tone, it is reasonable to imagine that emotional frames are relevant in this context (Nabi, 2003). However, though concerns about presenting health information in terms of excessive hope (e.g., Cohen, 1997), excessive fear (Gwyn, 1999; see also Meyer, 1990), and sometimes both (Danovaro-Holliday et al., 2002) have been raised, they have yet to be examined in the extant literature. For deeper insight into the possible effects emotional health news framing may have on audience health responses, we turn to the literature on emotions as frames.

Framing and emotion

Nabi's (2003, 2007) emotion-as-frame model suggests that discrete emotions, like fear, anger, and hope, once evoked by message content, selectively direct cognitive efforts by (a) making emotion-related information accessible from memory, (b) directing attention to information expected to relieve negative emotions and perpetuate positive ones, and (c) differentially influencing risk perceptions and, in turn, attitudes and behaviors (Nabi, 2007). Applied to health news, topics presented in terms of threat, for example, would likely evoke fear whereas those presented in terms of new solutions to existing health problems would evoke hope. Once evoked, those emotions would direct decision making based on the emotion-relevant information made accessible from memory (e.g., knowledge of personal risk factors,

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awareness of protective actions), as well as information from the story itself. Although related to other forms of framing that incorporate the notion of valence (e.g., gain/loss or positive/negative attribute framing), emotion-based framing is unique in its focus on discrete emotional states, which, unlike less differentiated affect-based constructs, have evolutionary-derived motivational goals and action tendencies that direct thought processes and behavior.

Health news stories are particularly interesting to study from an emotion-as-frame perspective because the market-driven nature of journalism leads mass media presentations of health news to be exaggerated or "sensationalized" to attract and hold the audience's attention (Nelkin, 1996; Ransohoff & Ransohoff, 2001). Thus emotional arousal is likely a hallmark of such stories. However, to date, there has been minimal attention to the role of emotion in the effects of health news. In fact, the extant research on the influence of health news on attitudes and health behaviors typically focuses on aggregate levels of news presentation and consumption, like how local news coverage of cancer promotes fatalistic beliefs about cancer prevention (Niederdeppe, Fowler, Goldstein, & Pribble, 2010) or how national news coverage of mammography influences mammography utilization (Yanovitsky & Blitz, 2000). Such research demonstrates that news consumption can impact audience attitudes and behaviors, but offers little insight into how the nature of the news coverage facilitates or interferes with such effects and what, if any, role emotion plays in this process.

Still, some recent studies have examined the structure of health news in ways that speak to emotional arousal issues. In considering the structure of print, radio, television, and Internet news, Berry, Warf-Higgins, and Naylor (2007) found health topics are often discussed in terms of risk and strong language, which is consistent with a fear frame. Relatedly, Hurley, Kosenko, and Brashers (2011) found 65% of Internet-based cancer news contained message features linked to uncertainty, which is also indicative of a fear frame paradigm.

Most directly relevant, Goodall et al. (2012) conducted a content analysis of print and electronic news coverage of the H1N1 virus from a fear appeal perspective, looking for the appearance of threat and efficacy information within the news coverage. They found that most stories (86%) referenced threat, and of these, 94% did so in the first third of the story. Further, the threat coverage was frequently sensationalistic, with more than half of stories referring to "pandemic," "outbreak," or death in ways disproportionate to the actual threat. They also found that efficacy responses were included in 56% of the stories, but of these, only 23% made statements speaking to the effectiveness of such actions. This finding is consistent with Clark (2011), who found that only 16% of health articles contained "mobilizing" information that would allow readers to act on existing attitudes. Ultimately, only 2.5% of stories included all four components associated with fear appeals. If news stories are processed like fear appeals, this composition suggests that health stories are unlikely to positively influence audiences' health behaviors. However, this assumes news stories are, in fact, processed as fear appeals, which may or may not be the case. Indeed, the emotion-as-frame model suggests that effects may not be linked so tightly to classic fear appeal structure but rather that the audience's prior knowledge may be as, or more, important as the message elements of threat and efficacy.

In sum, the nature of health news reporting and some content analytic work combine to suggest that health stories are likely infused with emotion. Yet the effects of such presentations have yet to be tested empirically. Further, though it has been argued that health stories may be processed like fear appeals, the emotion-as-frame perspective suggests a different process is at play. That is, different emotions evoke different perceptions of risk and make accessible different stores of previously held information that combine to influence behavioral intentions and action. This research seeks to shed light on how differently framed emotional health stories influence risk perceptions and health behavior intentions, with particular attention to the role of efficacy (relevant to both the fear and hope literatures) and news credibility (relevant to the news literature).

As a context for study, we chose the development of the vaccine for the sexually transmitted disease human papillomavirus (HPV), as it is a highly relevant health threat to the college-aged population of the sample used. Further, the focus on a potential breakthrough prevention tool not only provided the opportunity to examine both hope and fear but importantly, also allowed us to see whether audiences draw from personal knowledge regarding protective behaviors, as suggested by the emotion-as-frame model, given that the vaccine was not actually available at the time of data collection.

Effect of emotion frame and efficacy information on risk perceptions and intentions

As we consider the emotions of interest—fear and hope—both could affect perceived risk, but in very different ways. Fear is associated with both increased perceived severity and susceptibility (e.g., Lazarus, 1991; Nabi, 1999; Rogers, 1975; Witte, 1992). Conversely, hope is associated with the desire for a positive outcome in the face of adversity (Lazarus, 1991; Snyder, Cheavens, & Michael, 2005). Thus, it is reasonable to expect that those exposed to a health news story framed in terms of fear will perceive their risk to be higher than those exposed to a health news story framed in terms of hope and, in turn, be more motivated to protect themselves from that threat. Consequently, we predict:

H1: Relative to those exposed to a hope-framed health news story, those exposed to a fear-framed story will have (a) higher perceived future risk of contracting HPV, and (b) higher intentions to engage in protective behaviors.

Regarding efficacy, some health stories suggest a solution is available or imminent whereas others might suggest a solution is less likely or make no mention of solutions at all. As the suggested effectiveness of any means of addressing a health threat may influence audience perceptions of risk and intentions to engage in protective behaviors, we propose:

H2: Relative to those exposed to high-response-efficacy information in a health news story, those exposed to low-response-efficacy information will have (a) heightened perceptions of future risk of contracting HPV, and (b) increased intentions to engage in preventative behaviors.

Emotion frame and efficacy interactions in news exposure effects

Although these main effects are possible, it is the potential frame-efficacy information interaction and its effects on behavior intent that are most intriguing. This is in part because of the competing perspectives through which such effects might be evidenced—one derived from the persuasion literature (referenced earlier) and the other from the news literature. Regarding the former, news messages may be processed as persuasive health messages with perceived threat and efficacy as the keys to influence (Goodall et al., 2012). Though the fear appeal literature suggests that high-fear/high-efficacy messages are, in fact, the most persuasive (Witte & Allen, 2000), the emotion-as-frame perspective offers a more nuanced prediction. Recognizing that (a) emotions motivate adaptive action (Lazarus, 1991) and (b) people are motivated to act in ways consistent with their currently held beliefs (e.g., cognitive dissonance theory; Festinger, 1957), a fear-framed message should generate action when audience members are primed to think of health behaviors they already believe to be effective. Thus, to the extent audience members perceive threat and can imagine a means of self-protection in the present, they are likely to be motivated to pursue such courses, regardless of whether the news story makes mention of them. Importantly, protective behavior is only likely to occur if the threat makes accessible efficacy information from the audience's own knowledge stores. For example, if a news story reports that a vaccine may not work, an audience may still feel efficacious if its members know and believe that washing hands is another way to protect themselves from illness. From this perspective, the high HPV fear/low vaccine efficacy story should generate the greatest degree of threat and thus motivate respondents to perform risk avoidant behaviors with which they are already familiar (i.e., using condoms).

Conversely, one might imagine that hope/high-efficacy stories might lead respondents to feel particularly confident that the health risk is low and thus the need to act less urgent. Thus, if perceived risk is the key to a news story's influence on behavioral engagement, as the persuasion literature might suggest, we would expect an interaction between emotion and efficacy content such that:

H3: Emotion frames interact with response efficacy information such that the fear/low-efficacy story will generate the (a) highest perceived risk and (b) highest intentions to engage in protective behavior, whereas the hope/high-efficacy story will generate the lowest perceived risk and lowest intentions to engage in protective action.

There is, however, an alternative route through which health news may impact behavior based not on the assumption that news stories are comparable to other sorts of persuasive health messages but rather on the assumption that news presentation's propensity for sensationalism influences how health information is received, undermining trust in health news and thus minimizing its potential for influence. Indeed, the tendency of newscasts to exaggerate emotional components of stories might harm their credibility (Grabe, Zhou, & Barnett, 2001; Vettehen, Nuijten, & Beentjes, 2005). Thus, the question becomes: How do emotional framing and efficacy information combine to influence perceptions of news credibility?

We argue that perceptions of news credibility and positive behavioral influence are likely most threatened when audiences suspect news organizations of sensationalism. Although some might believe that exaggerated fear would be perceived as the most sensationalistic, we suggest that both fear and hope frames may be perceived as sensationalized when the emotional frame of the story and the information presented within the story are incongruent. That is, if the emotional frame used to capture attention is not consistent with the nature of the information in the story (e.g., exaggerated fear is used for a relatively minor concern that is easily addressed or avoided, or exaggerated hope is used for a situation that is not likely to have an easy resolution), audiences may perceive the news as misrepresenting the information for the sake of a "better story." This, in turn, will likely damage credibility perceptions and thus limit the likelihood that audiences would alter their behaviors in light of the story information they receive. Thus, we propose the following alternative route of influence:

H3$_{alt}$: Emotionally-inconsistent presentations (fear/high efficacy and hope/low efficacy) will engender (a) less trust in health news and (b) less protective behavior than emotionally-consistent presentations (fear/low efficacy and hope/high efficacy).

Method

Participants, procedure, and design

This study employed a 2 (*story emotion:* fear vs. hope) × 2 (*efficacy:* high vs. low) plus control between-subjects design. One hundred and eighty-two undergraduates were recruited to participate in a study on people's perceptions of news stories. Of these, four reported having been previously diagnosed with HPV and thus were omitted from analysis, leaving 178 valid cases. Of these, 65% were female. Their average age was 19.31 years (SD = 1.31), and the majority were underclassmen (35% freshmen, 38% sophomores). Within the sample, 61% were White, 18% Asian American, 12% Hispanic, 1% African American, 1% Native American, and 7% Other. Further, 68% were sexually active.

In groups of 2 to 15, participants completed a survey in which they were first asked about the relevance of specific health issues, their TV viewing habits, their perceptions of news credibility, and their risk-related behaviors. Respondents then read one of five news articles—either one of the four

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experimental news stories on the development of an HPV vaccine, or a control news story on health policy—after which they provided their assessments of the stories, their perceived risk of being diagnosed with a range of health conditions, their intentions to engage in a range of prevention and detection health behaviors, and their trust in both the news and the scientific community.

Stimuli

The topic of HPV was selected for both its relevance to the student participants and, given that the data were collected before the HPV vaccine received Food and Drug Administration (FDA) approval, its minimal presence in the news or other media. Each article was between 476 and 485 words. The four experimental stories were created based on information drawn from actual news stories found in the Lexis/Nexis database, and all focused on HPV rates in the United States and the scientific research on the development of an HPV vaccine. There were two manipulations in the messages: emotional frame and efficacy information. The emotional frame manipulation focused on evoking fear versus hope about HPV. This was done by manipulating the headline and the first paragraph of each article. In the fear conditions, the headline and lede highlighted the threat by referencing the epidemic of HPV. In the hope condition, the headline and lede highlighted the possibility of positive outcomes by announcing a breakthrough in HPV research (see the appendix).

The second manipulation concerned the efficacy of the vaccine. In the high-efficacy conditions, the vaccine was pronounced to be 100% efficacious and ready for distribution sometime in the next year. The low-efficacy messages indicated that results were promising, but the vaccine had a long way to go before it would be ready for public distribution and, even then, would only be appropriate for those aged 12 years and younger (below the age range of the sample). The manipulation was introduced in the headline and elaborated in the latter paragraphs of the stories. Again, all facts were drawn from various news articles on this subject and were conceptually consistent with the targeted manipulations.

The two manipulations generated four experimental messages: hope/high efficacy, hope/low efficacy, fear/high efficacy, and fear/low efficacy. Examples of the story headlines include "HPV Rates Reaching Epidemic Levels: Scientists still testing experimental vaccine" (fear/low efficacy) and "Breakthrough Vaccines Protect Against HPV: Scientists say vaccines will prevent common STD" (hope/high efficacy). Because the vaccine was not available at the time of the study, this design allowed for a clearer test of the emotion-as-frame model as it required audiences to rely on their current knowledge store to direct their behavior, rather than simply relying on message information.

Those in the control condition read a news story on health care policy entitled "Budget Accord Signals Higher Payments for Medicaid Recipients," which discussed a bipartisan effort to control Medicaid costs (467 words).

Measures

Measures are presented in the order in which they were completed. Unless otherwise specified, the measures were developed for this research.

Perceived health issue relevance and knowledge

Participants were first asked to consider a number of health issues, including HPV, and rate the relevance of each on three, 7-point scales (*not at all relevant/very relevant, not at all important/very important, doesn't affect me at all/affects me very much*). These items were combined to form a single-factor, reliable scale (α = .82; M = 4.21, SD = 1.53). Next they were asked to consider these same topics, including HPV, and rate how knowledgeable they were of the symptoms, risk factors, treatment, and means of prevention for each illness on scales ranging from 1 (*not at all*) to 7 (*very*). These items were drawn from Nabi, Roskos-Ewoldsen, and Dillman-Carpentier (2008) and formed a single-factor, reliable scale (α = .90; M = 3.96, SD = 1.57).

Trait risk-taking

Given the context of this research involves risky health behaviors, we included the 21-item version of the Risk-Taking Behaviors Scale (Weber, Blais, & Betz, 2002) to allow us to control for participants' judgments of positive and negative outcomes of health/safety behaviors. Items were assessed on 1 (*extremely likely*) to 5 (*extremely unlikely*) scales. Sample items include "going camping in the wild," "frequent binge drinking," and "never wearing a seatbelt" (α = .79; M = 2.57, SD = .51).

News credibility

Participants then completed a 12-item news credibility scale (Gaziano & McGrath, 1986) for which they were asked to think about the news sources in general with which they are familiar (print, TV, or online) and indicate their perception of news credibility on 1 to 5 scales. Sample items include "is biased/is unbiased," "is fair/unfair," "is accurate/is not accurate," and "can be trusted/cannot be trusted" (α = .83, M = 2.99, SD = .57).

News and TV consumption

Participants then indicated the amount of time they spend each week reading the newspaper (print or online) or watching TV news. Respondents reported approximately 2.5 hours of weekly newspaper consumption (M = 2.55, SD = 2.31) and nearly 2 hours of television news consumption (M = 1.94, SD = 2.28).

Finally, as a filler question, participants were asked how many hours of television they watch during four time periods during the average weekday and weekend day. Responses were combined and averaged to determine average daily TV viewing hours (M = 3.54, SD = 2.61).

Emotional response

After reading one of the five news stories, the participants were asked how much of 12 emotions they felt while reading the news story, on scales from 1 (*very little*) to 7 (*very much*).

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Of these, four related to fear (fear, nervous, anxious, worried; α = .84) four related to hope (hope, optimistic, encouraged, positive; α = .90), and four related to anger (frustrated, irritated, angry, annoyed; α = .90). These items have been used in previous research (e.g., Nabi, Stitt, Halford, & Finnerty, 2006), and each set of items reflected a single-factor scale.

News story assessments and attention

Participants then provided their assessments of the news story, on 1 (*strongly disagree*) to 7 (*strongly agree*) scales, on a range of qualities including *typical* and *similar* (r = .89, p < .001; M = 4.36, SD = 1.41), *overstated* and *distorted* (r = .54, p < .001; M = 3.07, SD = 1.03), *informative* and *educational* (r = .66, p < .001; M = 5.52, SD = 1.04), *dull* and *boring* (r = .69, p < .001; M = 3.05, SD = 1.28), *interesting* and *engaging* (r = .87, p < .001; M = 4.89, SD = 1.37), and *easy to follow* and *understand* (r = .70, p < .001; M = 5.67, SD = .94). Attention to the story was then assessed with three items, which asked how closely they read the story, how much attention they paid to it, and how interested they would be in reading a similar story in the future (α = .83; M = 4.77, SD = 1.14).

Vaccine likelihood

As a manipulation check for efficacy information, participants were then asked about the likelihood of vaccines and cures for various diseases (skin cancer, HPV, breast or testicular cancer, heart disease, AIDS/HIV, and diabetes) being developed in the next 5 years as well as in their lifetime on 0 (*0% likelihood*) to 10 (*100% likelihood*) scales. For the manipulation check, the likelihood of an HPV vaccine being available within the next 5 years was the focus (M = 5.98, SD = 2.69).

Behavioral intentions

Next, participants were presented with a range of prevention and detection behaviors (e.g., daily use of sunscreen, eating fruits and vegetables, regular dental checkup, diabetes testing) and were asked to indicate the likelihood from 0 (*0% likelihood*) to 10 (*100% likelihood*) that they would engage in the behavior (a) within the next 6 months and (b) at some point in the future. Embedded in these lists was the sexually transmitted disease (STD) prevention behavior of always wearing a condom during intercourse (r = .65, p < .001; M = 7.75, SD = 3.02).

HPV risk likelihood

Respondents were then instructed to consider a list of diseases (e.g., skin cancer, heart disease, diabetes) and asked to indicate the likelihood, on a scale of 0 (*0% likelihood*) to 10 (*100% likelihood*), that they will experience that outcome within the next 5 years and in their lifetime. HPV, the disease of interest, was embedded within this list (r = .84, p < .001; M = 1.70, SD = 2.03).

Trust in science and health news credibility

Respondents were asked to rate their confidence in the ability of scientists to find cures for diseases, their confidence in the validity of the scientific community's research findings as presented in the news, and their level of trust in the accuracy of the health information in the news, all with 1 (*very little*) to 7 (*a great deal*) scales. The first item was an indicator of trust in science. The latter two items were combined as an indicator of health news credibility (r = .63, p < .001; M = 4.72, SD = .89).

Demographics

Respondents were asked to provide demographic information, including age, gender, race, and whether or not they were sexually active, and if so, the frequency with which they used condoms during sexual intercourse.

Results

Manipulation checks

A 2 × 2 analysis of variance (ANOVA) revealed a main effect for story emotion on felt fear, F(1, 133) = 18.14, p < .001, η^2 = .12, and felt hope, F(1, 133) = 13.22, p < .001, η^2 = .09. Group comparisons indicated that the fear frame (M = 3.70, SD = 1.26) evoked more fear than the hope frame (M = 2.79, SD = 1.29). Conversely, the hope frame (M = 4.93, SD = 1.04) evoked more hope than the fear frame (M = 4.22, SD = 1.28). Although the efficacy manipulation had no impact on fear (p = .49), it did impact hope, F(1, 133) = 3.48, p = .06, η^2 = .03, suggesting that, as one might expect, the high-efficacy messages evoked more hope than the low-efficacy messages. No interactions were significant (p > .40).

A 2 × 2 ANOVA on the likelihood of an HPV vaccine being available in the next 5 years indicated a significant main effect for efficacy, F(1, 133) = 5.93, p = .02, η^2 = .04, suggesting those receiving the high-efficacy messages (M = 6.58, SD = 2.73) were more likely to believe an HPV vaccine would be available than those receiving the low-efficacy messages (M = 5.46, SD = 2.57). As expected, there was no effect of story emotion on likelihood of vaccine availability (p = .80), and there was no significant interaction (p = .29). These results suggest successful manipulations.

We then looked for any unexpected differences in attention paid to the message or in message perceptions (i.e., evaluations of typicality, informativeness, interestingness, distortion, comprehensibility). There were no significant main effects or interactions involving these variables (ps > .05), with one exception. The high-efficacy messages were perceived as more comprehensible than the low-efficacy ones (p = .04). However, given the 18 tests involved in these analyses, it is expected that at least one significant difference would arise by chance. Thus, we conclude these data support the messages as generally comparable on these message perceptions.

Finally, no significant differences emerged across conditions in age, gender, whether participants were sexually active, trait risk, perceived HPV knowledge, or perceived HPV relevance (all ps > .10). Thus, randomization to condition appears successful.

Data analysis

In light of the experimental design, the data analytic strategy was primarily based on analysis of covariance (ANCOVA),

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with each manipulation serving as an independent variables. Correlations of the individual difference variables with the dependent variables of interest were assessed to determine appropriate covariates. Gender did not significantly relate to either perception of HPV risk or condom use intentions (*p*s = .30–.47). However, being sexually active, trait risk behavior, and HPV relevance significantly related to either perception of HPV risk, or condom use intentions, or both. When included in the analyses, only HPV relevance and trait risk behavior proved significant at $p < .05$. As sexual activity was not significant and its inclusion did not alter the results, it was not included in the analyses reported. Finally, despite evidence of unequal variances across groups for health news credibility (Levene's test $p = .02$), ANOVA is robust in the face of the sorts of minor violations found here. Given the results are virtually identical when assuming equality of variance as when not, all reported results assume equal variance.

Emotion frames, efficacy, risk perceptions, and behavioral intentions

H1 and H2 were tested with a 2 × 2 ANCOVA in which emotion frame and efficacy information were included as main effect variables and HPV relevance and trait risk were included as significant covariates ($p < .05$). H1 predicted a main effect for emotion frame such that those exposed to the hope frame would have lower perceived risk of contracting HPV and lowered intentions to engage in protective behaviors compared to those exposed to the fear frame. The ANCOVA revealed no significant difference between the two emotion groups in terms of risk perception ($p = .84$) or prevention behavior intentions ($p = .39$). Thus, H1 was not supported.

H2 predicted a main effect for the efficacy manipulation such that those exposed to stories framed in terms of high, versus low, response efficacy would have lowered perceived risk of contracting HPV and lowered intentions to engage in preventative behaviors. The ANCOVAs revealed no significant difference between the two efficacy groups in terms of risk perception ($p = .21$) or intentions of regularly using condoms ($p = .78$). Thus, H2 was not supported.

Table 1. Story condition by risk perception, trust in health news, and health behavior intentions.

		Story condition			
		Fear		Hope	
		Low efficacy *n* = 36	High efficacy *n* = 33	Low efficacy *n* = 37	High efficacy *n* = 31
Risk perception	*M*	1.69	1.95	2.26	1.50
	(*SD*)	(1.60)	(2.58)	(2.55)	(1.83)
Health news credibility*	*M*	4.81	4.64	4.50	4.97
	(*SD*)	(.78)	(.85)	(1.13)	(.64)
Condom use intentions*	*M*	8.12	7.30	7.33	8.61
	(*SD*)	(2.57)	(3.12)	(3.45)	(2.20)

*Emotion/efficacy interaction significant at $p < .05$.

Story structure effects: Risk perception versus health news credibility

H3 and $H3_{alt}$ predicted different ways in which emotion frame and efficacy information might interact to ultimately influence behavior. H3 suggested that the fear/low-efficacy condition would produce the greatest perceptions of risk and behavioral intentions and the hope/high-efficacy condition the lowest. $H3_{alt}$ suggested the emotion-consistent, and thus less sensationalistic, messages (fear/low efficacy and hope/high efficacy) would generate greater perceptions of trust in health news and stronger behavioral intentions.

To test H3a, an ANCOVA with the structure described previously and risk perception as the dependent variable was conducted. No significant interaction emerged ($p = .19$). Thus, H3a was not supported.

To test $H3a_{alt}$, the ANCOVA was rerun with trust in news as the dependent variable. A significant interaction between emotion frame and efficacy was revealed, $F(1, 131) = 4.50$, $p = .06$, $\eta^2 = .03$ (see Table 1). As predicted, the emotionally-consistent conditions ($M = 4.88$, $SD = .72$) evidenced greater trust in health news than the inconsistent conditions ($M = 4.56$, $SD = 1.00$). Thus, $H3a_{alt}$ was supported.

To test H3b and $H3b_{alt}$, an ANCOVA with behavioral intent as the dependent variable and emotion frame and efficacy condition as the predictor variables was executed. A significant interaction for behavioral intentions was revealed, $F(1, 130) = 6.21$, $p = .01$, $\eta^2 = .05$. Consistent with $H3b_{alt}$, low efficacy generated stronger intentions to engage in protective behaviors (using condoms) when paired with fear more so than with hope. Further, high efficacy generated stronger

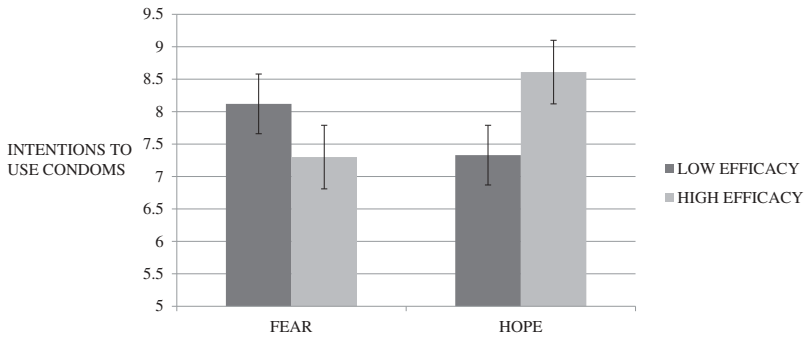

Figure 1. Interaction between emotion frame and efficacy level on intentions to use condoms.

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intentions to engage in protective behaviors when paired with hope relative to fear (see Figure 1). Thus, $H3b_{alt}$ was supported.

The role of perceived knowledge

The emotion-as-frame model suggests that prior knowledge about prevention measures should moderate behavioral effects such that those higher in perceived HPV prevention knowledge would be more susceptible to emotional framing effects. In light of this expectation, we intentionally chose a health topic on which most students would likely be knowledgeable (i.e., sexual health) such that they would have prior knowledge about STD prevention to inform their decision making. Indeed, nearly 70% of the subjects reported a score over the midpoint of the perceived knowledge of HPV prevention item (M = 4.84, SD = 1.90).

In light of the significant interaction that emerged in the test of $H3b_{alt}$, we investigated the theoretical prediction that emotional framing effects would be stronger for those with higher, versus lower, perceived knowledge. An ANCOVA with behavioral intent as the dependent variable and emotion frame consistency and perceived HPV prevention knowledge (dichotomized) as the predictor variables (with age and perceived risk as significant covariates) was conducted, revealing a significant interaction, $F(1, 129) = 3.95$, $p = .05$, $\eta^2 = .03$. As expected, the emotionally-consistent story frames evidenced greater influence on behavioral intention than the inconsistent frames for those higher in perceived knowledge (M = 8.75, SD = 2.22 vs. M = 6.74, SD = 3.63), but no difference emerged for those lower in perceived knowledge (M = 8.00, SD = 2.53 vs. M = 7.94, SD = 2.84; see Figure 2). These findings are consistent with the emotion-as-frame perspective and support perceived knowledge as a moderator of emotional framing effects.

Additional analyses

The preceding findings suggest that when news stories are emotionally-consistent, they may generate greater intentions for engaging in protective behavior (M = 8.34, SD = 2.40) than stories that are internally inconsistent (M = 7.32, SD = 3.27). A logical question then emerges—how might these groups compare to the control group? Are emotionally-consistent news stories boosting behavioral intent or are emotionally-inconsistent stories harming intent? The control group evidenced a condom use intentions level (M = 7.49, SD = 3.40) more similar to the emotionally-inconsistent stories than to the emotionally-consistent ones. Although an ANOVA indicated that this difference was not statistically significant ($p = .14$), the trend suggests that an emotionally-consistent frame may help promote positive health behaviors whereas an emotionally-inconsistent frame may offer no benefit.

Next, we explored whether perceptions of the news story might mediate the relationship between story emotional consistency and behavioral intent. We first explored the correlation between the consistent versus inconsistent stories and behavioral intent, controlling on trait risk and HPV relevance, $r(132) = .21$, $p = .015$. We then added health news credibility as an additional control. However, the initial relationship held, $r(131) = .23$, $p = .01$. A bootstrapping-based test of mediation using the Preacher and Hayes SPSS macro MEDIATE confirmed this finding. With health news credibility in the model, emotional consistency remained a significant predictor of condom use intentions ($p = .02$), and the confidence interval (based on 5,000 samples) for the indirect effect of emotional consistency on behavioral intentions through health news credibility included 0 (effect = –.12, SE = .16, CI: –.48 to .05).

Indeed, after considering the range of emotional responses to the story (fear, hope, anger) as well as cognitive responses (attention, typicality, distortion, informativeness, comprehensibility), the relationship between the two remained significant and of comparable magnitude. Thus, it appears that the effect of the emotionally-consistent news frame was not mediated by the emotional or cognitive story perceptions assessed in this study.

Finally, we performed a 2 × 2 ANOVA with fear frame and efficacy as main effect variables and trust in science as the dependent measure. No main effect or interaction emerged (ps > .70). Thus, the implications of various styles of news coverage on health news credibility did not extend to trust in the scientific community.

Discussion

This research sought to examine how different emotional frames (fear, hope) and different response efficacy content in health news stories might impact perceptions of risk, behavioral intentions, and health news credibility. Our

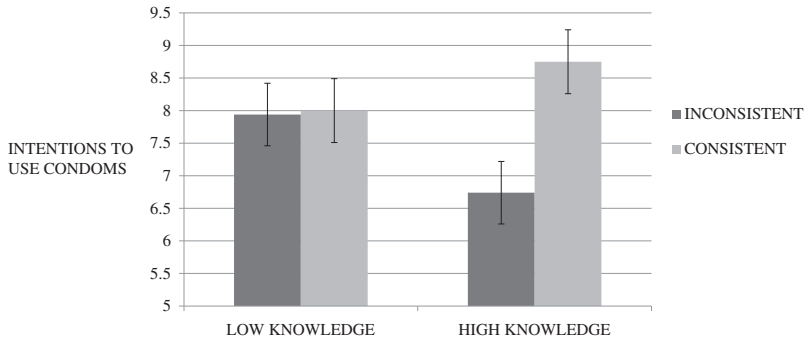

Figure 2. Interaction between message emotional consistency and perceived knowledge on intentions to use condoms.

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findings suggest that, counter to expectation, emotion type and efficacy information did not evidence independent influence on perceptions of risk or intentions to perform prevention behaviors. Rather, the emotion and efficacy information interacted such that those exposed to the emotionally-consistent fear/low-efficacy or hope/high-efficacy news stories were more likely than others to intend to perform protection behaviors (i.e., wearing condoms). This finding highlights the importance not just of emotion but of emotional consistency in news presentation to the outcomes generated by news exposure. Further, given that none of the news stories included any recommendations for action and they made no mention of condoms, the results offer valuable evidence that health news stories may influence behavior not necessarily from what they say but from the prior knowledge they might prime about effective action, consistent with the emotion-as-frame model (Nabi, 2007). Finally, emotion and efficacy interacted such that emotional consistency boosted trust in health news, though not perceived risk. Although health news credibility did not mediate the effect of story exposure on behavioral intentions in this study, these results suggest that when it comes to health news stories, a more nuanced consideration of story structure and context, beyond that offered by the persuasion literature, is important.

One especially intriguing question that arises from these data is why hope/high-efficacy messages were as effective as fear/low-efficacy messages in boosting protective behavioral response. We argued earlier that the desire for cognitive consistency between beliefs and actions may help to explain why those under greater threat would be especially motivated to pursue previously-known responses. Indeed, the arena of problem-focused coping is premised on the assumption that people cope with threats and challenges by looking for solutions (Lazarus & Folkman, 1984), so relying on prior knowledge to motivate behavior under threat seems logical. But why would hope/high efficacy—the most positive condition—behave similarly? We suggest this outcome is similarly well explained by the desire for cognitive consistency (Festinger, 1957). Hope-based emotional news frames, with their focus on the potential for positive future outcomes, encourage audiences to desire other positive outcomes, like maintaining good health. As such, audiences would be motivated to adhere to previously-learned protective actions to achieve such outcomes (for a similar argument regarding gain frame effectiveness see also Rothman & Salovey, 1997). Although we cannot rule out the possibility that the results are a function of affective valence rather than emotional framing, we suggest emotions-as-frames is the more likely explanatory mechanism as discrete emotions, not moods, are predicted to motivate emotion-consistent behavior, and the intentions results were based not on positive and negative valence but rather on emotional consistency.

The prior knowledge analyses further support the emotion-as-frame interpretation. The emotion-as-frame model assumes that emotion's behavioral influence is a function of not only message content but also information accessibility. Thus, those with prior knowledge of ways to address a health threat could draw from that knowledge to inform their actions when a news story triggers a threat. However, we would expect no such influence for those low in prior knowledge. Indeed, these data support that prediction. Thus, the evidence supports the emotion-as-frame model as the explanatory framework for these results, and suggests this as a viable model for future application to emotional health news stories.

A second question of interest involves the failure of trust in health news to mediate the stories' effects on behavioral intentions, despite demonstrating a similar pattern of influence. It is possible that the desire for protection is strong enough or automatic enough that the judgments of the message source, though influenced by the story structure, are not as relevant in short-run behavioral decision making. However, despite the lack of mediation in this research, we suggest that the effect on trust in health news is still potentially very important. If repeated exposure to emotionally-inconsistent, sensationalized health news stories results in reduced health news credibility, over time it might ultimately influence whether people choose to expose themselves to such stories, which obviously would negate any potential positive influence they could otherwise have. Thus, story structure's effect on perceptions of story credibility is arguably an important consideration for future research.

There are, surely, limitations in this study, including the use of a single print story (though based on a composite of actual news pieces) and particular operationalizations of efficacy and sensationalism. As such, we cannot know with this inaugural piece whether these findings would generalize well to other story structures or media forms (like broadcast or radio). Also, though we chose a health topic that is very relevant to young adults (i.e., a very common sexually transmitted disease), the sample's perceived risk was low, which made for a conservative test of the hypotheses. Thus, it is possible that with other samples and other illnesses, a different pattern of results (e.g., main effects for emotion or efficacy) might emerge. Still, this study is arguably a useful first step in examining the role of emotional framing in the effects of health news, and suggests future research in this area is warranted.

As we contemplate the implications of these data, we suggest that future research would benefit, first, from a content analysis of health news headlines and broadcast news teasers to determine the frequency of various emotional frames as well as the frequency of emotionally-inconsistent, sensationalistic coverage. Only after we document the prevalence of such frames can we know the true extent of this phenomenon and explore the impacts it may have at a more aggregate level. Future research might also further explore the effects of emotionally-consistent versus inconsistent presentations of health news to see not only whether these findings are replicable but also how different message features (e.g., including a recommendation that could be taken in the present) and different health topics (e.g., those less readily addressed) may influence this process. Further, though we did not find evidence that differential framing affected trust in science, such impact may be more likely found in inconsistencies across stories rather than within them. That is, the "flip-flopping" often attributed to science

reporting (e.g., drug recalls, the harms/benefits associated with caffeine or wine consumption) generally happen over time. Thus, it would be interesting to examine how news reports of such recommendation reversals impact trust in science.

Finally, considering how emotionality in health news presentations may influence a wider range of audience health-related responses to particular illnesses and to health issues generally would be of great interest. For example, if there is a predominance of "fear"-framed health stories as some have suggested (Gwyn, 1999), might this lead to (a) people seeking treatments that aren't medically necessary and/or (b) cynicism toward the news and the medical community generally? Might the presentation of unrealistically optimistic stories about medical advances lead audiences to have such faith in the scientific community that they worry less about possible health threats? Might this faith result in a failure to engage in critical prevention measures? Considering how repeated exposure to hope-inducing, medical breakthrough stories may affect audiences' general views of health would be of special interest.

To conclude, health news, a staple of print, broadcast, and Internet news outlets, is, by its nature, relevant to a vast proportion of the public and carries great capacity for emotional evocation. Understanding the news story elements that contribute to emotional arousal and the impact of such arousal on risk perception, behavioral intentions/behaviors, and health news credibility and trust in science are important areas of research. This study offers an initial exploration into these issues, and we hope it will stimulate much needed additional inquiry.

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Appendix

Comparison of key features across message conditions.

	Fear/Low efficacy	Fear/High efficacy	Hope/Low efficacy	Hope/High efficacy
Headline: emotion frame/ efficacy frame	HPV Rates Reaching Epidemic Levels: Scientists still testing experimental vaccine	HPV Rates Reaching Epidemic Levels: Scientists say breakthrough vaccines will protect against infection	Breakthrough Vaccines Protect Against HPV: Scientists say vaccines may prevent common STD	Breakthrough Vaccines Protect Against HPV: Scientists say vaccines will prevent common STD
Lede: emotion frame	Health officials warn that the human papilloma virus (HPV), which causes genital warts and can lead to cervical cancer, is the most common sexually transmitted disease in the United States. Los Angeles-based infections expert Dr. Mark Stebens says: "It's alarmingly widespread. It's a near epidemic."	(same as F/LE)	The medical community is thrilled by a new break-through in the prevention of one of the most common and widespread sexually transmitted diseases, the human papilloma virus (HPV). Experimental vaccines may not only protect women from cervical cancer, but also the much more common problem of genital warts.	(same as H/LE)
Transition: emotion frame and efficacy frame	Because this virus is so formidable, scientists have been motivated to develop a vaccine to stop its spread. Though clinical trials look promising, experts are still cautious. "We've made progress with HPV," says head of Merck laboratories Dr. Eliav Barr, "but I don't want to jump the gun."	While a diagnosis of HPV can be upsetting and even life-threatening, there is hope on the horizon in the form of two vaccines that have been tested with startling success. In a large-scale clinical trial of over 2,400 subjects, one vaccine has proven 100% effective in blocking the major forms of HPV, according to the vaccine's manufacturer Merck, Inc.	But scientists have been working on a vaccine to stop its spread, and clinical trials look promising, though experts are still cautious. "We've made progress with HPV," says head of Merck laboratories Dr. Eliav Barr, "but I don't want to jump the gun."	But there is hope on the horizon in the form of two vaccines that have shown startling success. In a large-scale clinical trial of over 2,400 subjects, one vaccine has proven 100% effective in blocking the major forms of HPV, according to the vaccine's manufacturer Merck, Inc.
Conclusion: efficacy frame	"These vaccines may represent one battle we've won," according to Stebens, "but we've still got a long way to go."	"We are trying to prevent HPV from becoming an epidemic," Stebens says. "These vaccines are a huge step in that direction."	(same as F/LE)	(same as F/HE)

Note. Full messages are available upon request.

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